

Report of the
DEPARTMENT OF HIGHWAYS
STATE OF NEVADA

For the Fiscal Years Ending June 30
1951-1952



H. D. MILLS
State Highway Engineer

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STATE OF NEVADA

EIGHTEENTH BIENNIAL REPORT

OF THE

DEPARTMENT OF HIGHWAYS

For the Fiscal Years of
July 1, 1950, to June 30, 1952

H. D. MILLS
State Highway Engineer



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STATE OF NEVADA

EIGHTEENTH BIENNIAL REPORT

DEPARTMENT OF HIGHWAYS

For the Term Year of
July 1, 1912 to July 1, 1913



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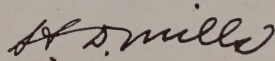
Stanley D. Sundeen
212 So. Nevada St.
Carson City, Nev. 89701

LETTER OF TRANSMITTAL

To the Honorable Members of the Board of Directors and the Nevada State Legislature:

Your State Highway Engineer respectfully submits herewith the Eighteenth Biennial Report of the Department of Highways, embracing the activities of the Department for the fiscal years 1951 and 1952.

We take this opportunity to express our sincere appreciation for the cooperation and support received from the Board of Directors, the Bureau of Public Roads, and the people of this State.

A handwritten signature in dark ink, appearing to read "H. S. Mills". The signature is fluid and cursive, with a large, stylized "M" at the end.

State Highway Engineer.

In Memoriam

During the biennium the following employees of the
Department of Highways were taken by death:

A. L. AVERETT

FRED R. BROTHERTON

R. BAMBERGER

JOHN CURTIS

C. V. MELARKEY

PARLEY TAYLOR

CHAS. A. TIBBS

P. L. WOODGATE

DEDICATION

The Eighteenth Biennial Report of the Nevada Department of Highways is dedicated to the many employees whose faithful service of 15 or more years has been an essential factor in making Nevada one of the leaders among road builders of the Nation. This report gives opportunity to mention the names of those who have been with the Department for 30 years.

30 OR MORE YEARS OF SERVICE

ARMSTRONG, GLEN F.	HOLCOMB, WILLIAM T.
BERNING, AUGUST, JR.	MILLS, HUSTON D.
GLOCK, JULIEN	POHL, ERNEST C.
REID, BONNIE O.	

25 TO 30 YEARS

BLAKER, CHARLES C.	PARRY, WILLARD R.
CROSS, ERNIE	PERRY, JAMES A.
DUNN, WALTER	QUINLAN, ALICE F.
ELDRIDGE, R. E.	RAWLS, PAUL
HANCOCK, J. LESLIE	ROSE, DALE
HEIDENREICH, ANDREW J.	SCHULTZ, MARION I.
LEWIS, ROBERT J.	SULLIVAN, JOHN M.
LOGAN, BEN H.	SUTHERLAND, DAVE
MILLER, FRANK E.	WAITE, MARVIN H.
MORRISON, F. H.	WRIGHT, OTIS W.

20 TO 25 YEARS

BERGER, FRANK J.	MANHIRE, JOHN T.
BODEN, ELDOR J.	McMURTREY, E. A.
BROWN, C. L.	MEACHAM, JOSEPH D.
BROWN, HIRAM C.	MILLIN, RAYMOND F.
CARROLL, FRANK J.	ODELL, W. ALLAN
CLYDE, V. W.	ROBBINS, PAUL E.
DRON, THOMAS L.	ROY, ROLAND F.
FELL, V. W.	SCOGGIN, E. G.
GIBSON, W. H.	SHARP, DAVE
HARMER, FRANK J.	SPRINGMEYER, CARL A.
HAYS, D. H.	SQUIRES, HERBERT A.
HEAPS, WILFORD H.	SUNDEEN, STANLEY D.
KINNE, ALFRED G.	VAUGHN, HAROLD J.
LEUTZINGER, EDWARD C.	WELSH, ANDREW
LITTLE, LAWRENCE W.	WILSON, WALTER C.

15 TO 20 YEARS

AUSTIN, NEIL H.	BORRNA, VICTOR
BAXTER, GEORGE M.	BRADLEY, DELILE
BENNETTS, R. H.	BRADLEY, RALPH W.
BLOXHAM, L. J.	CHRISTENSEN, JOSEPH O.
BOARDMAN, EDGAR T.	COCHRAN, L. F.
BONAFIOUS, JOE	COLEMAN, GEORGE P.

CORNING, JOHN
DAVIS, FRED A.
DECK, TED
DEPRATI, PETE
DOTY, STANLEY P.
DUBE, PAUL
FARNSWORTH, L. G.
FERRETTI, EUGENE L.
GARDNER, BILL
GIRAUD, JOSEPH J.
GOBELI, FRED
GREGORY, J. J.
GREEN, ARTHUR T.
GREENHALGH, JACK
GREULICH, FRED G.
GRIER, GEO. R.
HANNIG, REED
HARBIN, GUY S.
HAYMAN, WALTER
HOWARD, A. A.
JOHNSON, MATHIAS
JOHNSON, ORRIN
KOONTZ, LOUIS K.
KRAMER, A. T.
LANE, BRUCE M.
LEAVITT, THOMAS D.
LEAVITT, VINCENT E.

LOWER, RALPH E.
LUCAS, HARRY
MACK, LEON A.
MCCARDLE, JOHN E.
MCCOY, JOHN
MCDERMOTT, TONY H.
MCGRATH, JOHN
MCINNIS, J. R.
MARTY, GENE
MAYETT, A. W.
MEDER, ZITA D.
METZGER, HARRY M.
MILES, CYRIL D.
MILLER, AUGUST
MURPHY, C. E.
OFFEN, ELMER B.
O'SULLIVAN, JAMES
OTTINI, RALPH J.
PARVIN, JACK A.
PIERCE, BRYAN H.
REAM, MARY L.
REED, CHESTER H.
SMITH, CHARLES F.
STEWART, RAY
WALKER, OREN W.
WILLIAMS, ZEDDIE A.
ZILKEY, WILLARD O.

STATE HIGHWAY OFFICIALS AND HEADS OF DEPARTMENTS

BOARD OF DIRECTORS

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HON. W. T. MATHEWS, <i>Attorney General</i>	Member
HON. PETER MERIALDO, <i>State Controller</i>	Member

DEPARTMENT OF HIGHWAYS

H. D. MILLS.....	State Highway Engineer
W. T. HOLCOMB.....	Assistant State Highway Engineer
A. G. KINNE.....	Design Engineer
J. D. MEACHAM.....	Construction Engineer
A. BERNING, JR.....	Engineer of Personnel
CHARLES C. BLAKER.....	Equipment Engineer
E. T. BOARDMAN.....	Bridge Engineer
JAMES D. WALLACE, JR.....	Right of Way Engineer
STANLEY D. SUNDEEN.....	Office Engineer and Secretary to the Board
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PAUL R. RAWLS.....	Location Engineer
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ORVIS E. REIL.....	Manager—Planning Survey
OREN W. WALKER.....	Chief Draftsman
RALPH J. OTTINI.....	Traffic Engineer
FRANK BERGER.....	Federal Aid Roads Engineer
HERBERT E. SAMUELS.....	Public Relations Director

DIVISION ENGINEERS

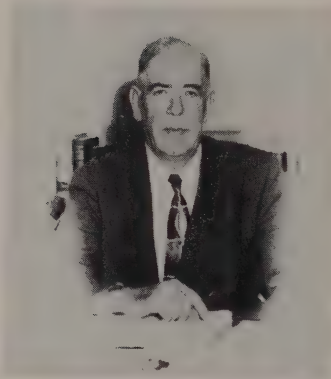
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JULIEN A. GLOCK.....	Division No. 3
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DENTON H. HAYS.....	Division No. 5

ASSISTANT DIVISION ENGINEERS

G. B. BROCKWAY.....	Division No. 1
H. A. SQUIRES.....	Division No. 2
PAUL ROBBINS.....	Division No. 4



CHARLES H. RUSSELL
Governor
Chairman, Board of Directors



W. T. MATHEWS
Attorney General
Member, Board of Directors



PETER MERIALDO
State Controller
Member, Board of Directors



H. D. MILLS
State Highway Engineer

DEPARTMENT OF HIGHWAYS

EIGHTEENTH BIENNIAL REPORT

In past summaries of the activities of the Highway Department, particularly of those years since World War II, stress has been placed, in our reports, on the economical limitations in our various operations. We recall that about a decade ago government and business both looked forward to the days when costs would become more stable. It is now common knowledge that such a return is not foreseeable in the near future, and once again in this, the Eighteenth Biennial Report to the Nevada State Legislature, the Governor and Members of the Highway Board, and to the People of Nevada, it is necessary to mention that personnel and finances are prime obstacles in our operation.

Despite the somewhat sour note of adverse conditions, it is with confidence, and perhaps a little pride, that this report reveals the many contracts for new construction and reconstruction completed during the 1951-1952 fiscal years and points out that not only are these accomplishments in line with the programmed work, but they also include many emergency jobs that were instigated, planned and completed within this period.

The people of Nevada, through their representatives in the Legislature, are encouraged to investigate the functions and operation of this Department in order that they might become better acquainted, first hand, with some of the problems encountered in highway construction and maintenance. In particular, attention is called to the need for changes in laws relating to methods of acquiring land for highway purposes.

At present the Highway Department is acquiring title to land for highway rights of way throughout the State in a manner which appears to be not in the best interests of the State. Much effort and money are expended in obtaining these rights of way, which in reality are merely easements, and which, in many instances, are paid for at the full value rate. At the end of the period for which the land thus obtained has served its use for highway purposes, the Highway Department does not have the right to exchange or sell or realize any return for the loss of use of the land, but can only abandon it.

In some instances, where a property owner's land is severed by highway right of way, payment is made for the land thus severed in addition to the right of way. Further right of way negotiations would be benefitted and helped were the Highway Department able to obtain title to this additional land.

It is, therefore, recommended that the Department be granted the authority to obtain title to the land required for highway purposes in fee simple, and that the Department be further authorized to disperse that land in any manner which would best serve the interests of the State at its discretion, rather than by the present system of requiring action and approval by the Legislature.

Officials of this Department are constantly besieged by counties,

cities, organizations, individuals and the like with requests to establish speed zones upon our highways within areas said to be hazardous to life and property. The Highway Department does not now have the legal power to set the zones, thus cannot comply with the many requests. Since each request must be met with a study of conditions such as road design and traffic, it follows that the Highway Engineer is best qualified to determine maximum speeds practical in any area on the highway system and it is recommended that the Legislature give consideration to bestowing this authority on the Highway Department and the Highway Engineer.

Much of our road system is worn and outmoded throughout the State. There is a practical need for an accelerated program of construction and reconstruction on a majority of our highways. However, the Department is unable at this time to carry out a program of this nature. Funds and personnel both are inadequate to cope with the situation. Although the financial picture as presented two years ago has improved slightly, approximately 10 percent more money has been expended during this biennium than the total income of two years ago. The general rise in costs of all materials and labor was responsible for the additional expense. Had the Department been able to hire or employ the personnel it required and desperately needs now, funds would have been insufficient to carry out an accelerated program.

It is only proper to again mention and refer you to a section devoted to personnel in this report, that now more than ever we are finding it difficult, and in some cases impossible, to hire and retain technically trained people to perform the tasks necessary in the operation of this Department.

With the efficient action of our law enforcement group, the State Highway Patrol, more and more operators convicted of overload and other operations damaging our highways, are paying penalties in the form of fines. Since the repairing of these roads abused by the overloading is becoming more and more expensive as labor and material costs continue to rise, it is felt that these payments should be placed in the Highway Fund from which they can be expended in maintaining the road system. It is further suggested that the law relating to the movement of overwidth vehicles be amended to allow the Highway Engineer who issues the permit for their movement to set the speed at which these vehicles may move, rather than the archaic provision now in the Motor Vehicle Statutes, limiting such movements to eight miles per hour.

It is further suggested and recommended that the legislative body, having full authority to designate and describe State routes, give thought and consideration to changing the description of that section of State Route 8A south of Battle Mountain.

PERSONNEL

The Department, due to the present world crisis and the continued rise in living costs, has been and still is confronted with a serious personnel problem, particularly in that of skilled technical help. Private industry, Federal agencies, defense plants and the armed forces have drawn heavily on available manpower. The attractive salaries paid by industries and other agencies have a very strong beckoning power for personnel engaged in State highway work where salaries are not geared to present-day rates. Times like these tend to cause a continual fluctuation of skilled, technical and professional personnel in every field. This Department has keenly felt the loss and lack of skilled and experienced personnel. To keep up with this situation, particularly during the construction season and winter maintenance operations, we have had to depend in many instances on one employee attempting to perform the work of two or more.

The Nevada Highway Department, during the past biennium, had a turnover in manpower of 470 employees, which amounts to 75.2 percent of our average personnel of 625. Severence of employment was for the following reasons:

To accept other employment.....	349
Entry into Armed Forces.....	48
Ill health.....	24
Discharged	34
Retired	7
Deceased	8

Because certain phases of highway engineering and administration are necessarily specialized, such positions cannot be filled by persons with general qualifications only. They must have specific engineering training or experience in highway work. In order to retain sufficient personnel to carry on design and other related work it has become necessary for us to accelerate the promotion or advancement of present personnel to higher and more responsible positions. Formerly, we were able to supplement this procedure by employing graduates of engineering schools, but during the past few years we have had little success in employing these graduates, as our salary rates are not comparable to those in private industries, defense plants or Federal agencies.

In spite of all the inducements we have been permitted to offer more designing and construction personnel is badly needed.

Employees of the Department are enjoying the provisions of the Nevada State Employees Retirement Act, and we have benefited by the fact that some of the older employees have remained with the department to become eligible for retirement, whereas they could otherwise have stepped out and secured positions in private industry and other agencies at a higher pay scale.

Lack of sufficient experienced personnel has been reflected, in a measure, during the past biennium, in delays in preparation of plans, acquisition of rights of way, and staffing of crews to supervise construction projects.

OPERATION BREAKTHROUGH

The exceptionally heavy late winter snows of February and March, 1952, caused a near disastrous condition in the northeastern part of the State, particularly in Elko, Eureka and White Pine Counties, and extending into Lander and Lincoln Counties.

When, due to continued storm conditions, it became apparent that outside help would be necessary to save the livestock industry of this area from terrible losses, the Governor, on March 20, 1952, declared the existence of an emergency and thus opened the way for securing Federal funds with which to finance recovery operations.

By order of the President of the United States, issued March 20, 1952, \$100,000 in Federal funds were made available for use in clearing roads off the State Highway system in the disaster area. This fund was later increased to \$150,000. The Federal Housing and Home Finance Agency administered the funds for the Federal Government.

This operation was confined to opening roads only, transportation of hay and feed being handled by the individual ranchers or other agencies. It was apparent from the outset that the only possible way of opening these county and ranch roads was with the use of crawler tractors equipped with dozers. Twenty-five tractors were secured from the Army, all coming from the Utah General Depot at Ogden. These tractors began arriving on the scene on March 21 and by the following day all were in operation at various places in the area.

In addition to the tractors furnished by the army, six were obtained from the U. S. Forest Service, in Idaho and Utah; several were secured from various contractors; and some from other individual owners. In all, some 53 tractors and dozers were employed for varying lengths of time from a few days to as much as three weeks. The last of the tractors were released on April 10, and the emergency declared ended on April 12.

In addition to the tractors and dozers noted above, 20 "weasels" were used. These are lightweight, high-speed tractors with wide treads which can be operated on top of packed snow without breaking through. Eighteen of these came from the Ogden Arsenal of the Army and two from the Indian Service at Stewart.

To operate these tractors at widely scattered points in the hundreds of square miles of area involved, required an even greater number of support vehicles including various sized trucks for hauling fuel and supplies, transport trucks to move the heavy tractors from one point to another as need arose, and camp wagons for the accommodation of personnel when they could not return to town or ranch.

With several feet of snow on the ground, in many cases fences being entirely buried, it was extremely difficult to keep tractors on the roads, and in many instances local people most familiar with the roads found it almost impossible to follow them.

Due to the comparatively high temperatures that prevailed during most of the operation, there being only slight freezing at night, it became apparent that as soon as the roads were clear of snow they would become almost impassable because of the mud. The weasels proved especially effective under these conditions, being able to transport fuel and supplies to the tractors when trucks could not get



In June 1951, the building was occupied by the Highway Department.

through. The weasels were also used effectively in breaking trails to hay stacks so that stock could be moved to the hay.

All army equipment was operated by civilian employees of the army, who came with the equipment from Ogden. They, together with personnel hired at points within the area, comprised a total of about 200 men on the operation for varying lengths of time.

Although final costs of the operation have not been computed at this time, it is expected that they will total about \$175,000. The additional \$25,000 was supplied by the army.



Nevada Day 1950. The Masonic Grand Lodge officially dedicates and lays the cornerstone of the new State Office Building wherein the headquarters of the Highway Department are now located.

ROADWAY DESIGN

It is the function of the design division to coordinate data gathered and prepared by other divisions of the Department in the preparation of plans, estimates and specifications for all contract work undertaken by the Department for construction, reconstruction or betterment work.

To prepare workable plans, estimates and specifications, complete in detail, for the various contracts it is necessary to obtain and to incorporate in the design all data possible. Following is a general outline of the vast amount of detail work necessary to develop a typical job; from the inception of a project to the completion of plans, estimates and specifications required before it can be advertised and placed under contract.

Preliminary work generally includes a traffic study, a route study, special studies, comparative estimates, programing, tentative standards, and typical sections.

Location work must, of necessity, involve preliminary alignment, final alignment, topography, cross sections, and land ties.

A preliminary review is usually required as to materials, rights of way, tentative design, and a conference with the Bureau of Public Roads.

Under design proper it is necessary to prepare work maps at various scales, profiles, cross sections, layout sheets, soils profiles, right of way strip maps, bridge layouts, agreements with railroads, utility companies, and other agencies, design notes, and to study foundation tests, soil tests, other tests, and material reports. In respect to roadway design, computations are made for preliminary and final earth work,



**Ample space and good lighting make pleasant working conditions
for the Design Department.**

minor structures, construction zone bypasses, special items, other items, as well as the tracing of plans and a complete plans check. On bridges there are required the design, the tracings, and the writing of specifications. Right of way acquisition requires a study of ownership, the estimated cost of acquisition, the preparation of strip maps, the filing of Federal lands maps, the preparation of deeds, the acquisition of rights to material deposits, and the preparation of special provisions relating to right of way agreements.

A final review of the completed plans is then made by the Design Department, the Right of Way Department, the Materials and Testing Department, and the Division Engineer under whose jurisdiction

the work is to be performed. This is followed by a subsequent review by the Bureau of Public Roads.

Following the final review and necessary adjustments the work is advertised for bids, the contract awarded, the agreement estimate for the Bureau of Public Roads prepared, and the necessary data sent to the field for the actual construction work.

After a project has been placed under contract the Design Department reviews all correspondence, reports, change orders, etc., pertaining to the contract in order that future designs will reflect the ever-changing conditions and advancements taking place in the construction industry.

During the biennium plans for the following tabulated projects were completed and the projects placed under contract:

	Number of projects	Miles
Federal Aid Primary System.....	12	106.43
Federal Aid Secondary System.....	25	349.97
Structures, Primary System (5).....	2	
Structures, F. A. S. System (13).....	6	
Emergency, State Maintenance Projects.....	6	64.22
Miscellaneous State Contracts.....	2	
Adjust and Move Buildings (6).....	5	
Mine Access Roads.....	6	100.29
Airports	4	
Total number of projects placed under contract.....	68	—
Total miles of highways placed under contract.....		620.91

The total cost of plan preparing for the above projects amounted to approximately \$510 per mile. This figure, however, cannot be used as a basis for estimating all design costs as the cost per mile varies on each and every project according to the details involved. As an example, the cost of preparing plans, estimates and specifications for the construction of a 15-mile secondary project, Alpha to 30 miles south of Palisade, Eureka County, was \$390 per mile while the cost of similar work for the 2.67 mile project on U. S. 91, Las Vegas Strip, cost \$3,060 per mile. The cost of design approximates 3.6 percent of the cost of construction.

The new State Office Building was completed and occupied during the biennium. One large drafting room, two office rooms, space for storage of survey notes, records, maps, etc., and one large basement room used by the reproduction section were allotted to the design division. There is ample space, good light and ventilation for the design force.

During the biennium 51 persons, on an average, were employed by the design division. Five are in the reproduction section, two in the engineering file section, and forty-four in design proper.

RECONNAISSANCE AND SURVEYS

During the biennium, reconnaissance and surveys have kept pace with the design and construction program, resulting in a slight increase of surveyed mileage over the previous two-year period.

Feasibility and justification of highway projects proposed for construction are usually determined by the number of people to be benefitted therefrom, the present and potential traffic conditions, and knowledge of other conditions pertaining to the project.

Reconnaissance is one of the initial steps on any project contemplated for location and construction. This work is especially important on new projects, that is, projects upon which no previous surveys have been made. A written report and sketch map of the project are usually required, describing the type of country encountered, drainage conditions, alignment and grades, and a rough estimate of construction cost. A detailed reconnaissance is rarely needed on reconstruction projects where the desired location betterment is confined to minor line changes. This preliminary work is usually necessary, however, on reconstruction projects where major line changes are indicated, or where the new location is to be entirely removed from the previously constructed highway.

As in the past, survey work was rather well apportioned throughout the State, with both new and resurvey projects being performed in most of the 17 counties. The distribution of surveys is governed by the need for both new highway construction projects, and reconstruction projects on previously constructed routes, and it changes somewhat from one biennial period to the next. Due to the vast amount of mileage contained in urban, primary, secondary, and mine access routes, however, some new survey or resurvey projects are made annually in practically all parts of the State.

A major portion of primary route surveys was confined to urban areas at points of greatest population, on routes which carry the bulk of traffic throughout the State. Traffic volumes have now reached the point where four-lane highways are necessary through and adjacent to the larger centers of population. Should present traffic trends continue, this higher type construction will soon extend to other parts of our primary highway system. This will be especially true on Highway U. S. 40 across the northern part, and on U. S. 91 across the southern part of the State. Some four-lane highway construction has been completed, and surveys are being made for several additional projects. Surveys through mountainous areas and for multiple-lane projects require considerably more time and detailed work, they also entail greater costs than ordinary projects in comparatively open country. Two representative projects now being surveyed are the Clear Creek Highway, a portion of U. S. 50 from Lake Tahoe to a junction with U. S. 395 about three miles south of Carson City, and U. S. 40 through the Truckee Canyon between Sparks and Wadsworth. The resurveys of these two projects have been carried on alternately with one survey crew, with the Truckee Canyon survey being started some two or three years ago. The Clear Creek survey was commenced during the summer of 1951, with about 50 percent of the remaining eight

miles of location being completed. With the coming of winter, work was suspended on this project and the resurvey along Truckee Canyon resumed. Work was again started on the Clear Creek job in June 1952 and the survey should be completed this year. The Truckee Canyon survey will be continued at a sufficiently rapid rate to meet the construction program for that route. Due to the increased costs of this heavier construction and the limited amount of funds available for a one-year program, construction projects are necessarily confined to rather short sections.

Due to larger recent appropriations of secondary funds, our secondary highway construction program has been greatly accelerated during the past few years. Mileage of surveys for this type of construction greatly exceeded that for primary routes during this biennial period. This is principally due to the cheaper roadway design and lower construction costs, which make it possible to construct more highway mileage than on primary routes.

During the past two years 429.7 miles of surveys on all types of road were completed at an average cost of \$756.96 per mile. This is an increase of 22 percent in mileage surveyed, and about 19 percent increase in cost per mile as compared to the previous biennium.

RIGHT OF WAY DIVISION

The Right of Way Division consists of a Right of Way Engineer, with a staff of approximately 14, including an Office Engineer, Clerk-stenographer, Agents, Draftsmen, and a Statistician.

When the alignment is adopted for a highway project, the width of the required right of way is determined by the proposed design and action to acquire it is commenced by the above group. This entails determination of the ownership of, and a study of the problems peculiar to, the lands involved, and the making of sketches, agreements, deeds and other legal documents, leading up to the eventual negotiations carried on by the agents. If a satisfactory settlement is not attained, it sometimes becomes necessary to resort to condemnation proceedings through the courts.

In the matter of negotiating for rights of way, the Highway Department should be represented by agents who are familiar with the appraisal of land and real estate and the effect that highway location and construction have on the property values. This is becoming more and more a major function of the Right of Way Division.

During the biennium, rights of way and material sites for highway projects on which construction plans were prepared, together with land for maintenance sites, were acquired across both public and private lands throughout the State.

The necessary data and sketches have been submitted to the Attorney General for his use in the prosecution of the condemnation proceedings for the right of way of the abandoned Virginia & Truckee Railway between Huffakers' and Reno Hot Springs. Action will be resumed relative to acquiring the balance of the right of way of this famous old railroad, which is needed for the proposed highway improvement between Reno and Carson City.



Before, and after adjustments to encroaching building, Las Vegas.





Before, and after adjustments to service station, South
Fifth Street, Las Vegas.



Additional personnel is needed and must be trained in the Right of Way Division as it is evident that the increased Federal-aid program requires right of way acquisitions and it is also evident that the task of securing rights of way will continue to become more difficult as the price of land and property is increasing. Highways within towns, cities, and agricultural districts require additional width as a result of increased traffic.

PLANNING SURVEY

Created in 1936 under the joint sponsorship of the U. S. Bureau of Public Roads and the State Highway Department, Planning Survey continues to function as an important agency within the Department. Statistical and economic studies and research are carried on for the purpose of developing factual data pertaining to all phases of an integrated highway program, and the basic data derived find use at the National as well as State level. Importance of Planning Survey from the National viewpoint is substantiated by the fact that a portion of the money for its operation is provided for by the Federal Aid Highway Act in an amount up to $1\frac{1}{2}$ percent of the total apportioned to the State.

Activities of the Planning Survey may be considered as:

(1) continuing studies necessary to maintain up-to-date highway statistics and to obtain data requisite for the computation of trends, and

(2) special studies designed for the solution of technical problems and for administrative purposes.

These studies are pursued under five prescribed categories—Inventory, Mapping, Traffic, Financial, and Special Studies.

The prime purpose of the inventory program is to maintain a complete and current record of the location and surface type of all roads and streets within the State, together with the adjacent culture. The project is carried on by a two-man party using a car equipped with a gyroscope for determining bearings from within the car, and odometer registering to 1/100th-of-a-mile for measuring distance, and a transcriber for recording notes. Detailed information thus obtained is not only a prerequisite of the mapping program but it also establishes facts necessary to substantiate requests directed to the Bureau of Public Roads for additions to or revisions in the Federal-Aid System.

Field work completed during the biennium included mapping control in Churchill, Clark, Mineral, and Storey Counties, and completion of some previously started in Pershing.

Geodetic control was carried into recovered portions of Churchill, Lander, Lyon, Mineral, Nye, Pershing, and Washoe County lines.

In addition, cooperative projects were carried on with Federal and State agencies.

Personnel of the U. S. Coast and Geodetic Survey performed considerable surveying within the State, and advance notice of their plans made it possible for our field crews to work with the Federal agency. In the fall of 1950, under this cooperative arrangement, mapping control was established along the Nevada-Oregon State line in Washoe

and Humboldt Counties; in 1951 control was established in sections of Ormsby, Lyon, Storey, and Churchill Counties, and partial coverage accomplished on a project which tied into the existing net in the vicinity of Carson City. This net was to extend to a point in the vicinity of Fillmore, Utah, but was postponed when the USC&GS crew was transferred to a job with a higher strategic priority.

All data recorded in the field were transcribed and card-indexed in the office, and our geodetic survey data are readily available, not only for our own use but for the convenience of many other Federal and State agencies.

One office operation of the inventory section is the coding of field data preparatory to IBM punching and tabulating.

Coding of rural-road inventory material on Federal-Aid Secondary routes and on all unconstructed State routes was completed during the biennium, as were the data for Douglas, Ormsby, Storey, and Washoe Counties.

General Highway County Maps continued to be in demand by individuals, land development companies, and research groups. No revised county maps were completed; however, drafting kept step with inventory, and some new maps were nearing completion at the close of the biennium.

A revised General Highway Map of the State as of 1951 became available to the public, and two-color traffic flow maps of Douglas County and of the cities of Reno and Sparks were completed. The Douglas County map portrays, by means of traffic-flow bands and figures, the data collected during the 1948 traffic reinventory of that county. The two city maps numerically depict block-by-block traffic. These traffic flow maps are available at a reduced scale, permitting convenience in handling without loss of legibility.

More than 100 thousand copies of the official road map of Nevada were distributed during each of the fiscal years of the biennium.

In addition to routine mapping, innumerable sketches and graphs were prepared in our drafting room for use in connection with special studies and to accompany reports of other divisions of the Department.

Traffic studies on a county-wide basis were continued throughout the biennium. A recount in Lyon County was completed in 1950; others were completed in Pershing and Humboldt Counties and in the northern sections of Lander and Eureka Counties during 1951; and, before the close of the biennium, others were under way in Mineral and Esmeralda.

In addition to this continuing program, studies were made on a State-wide basis to establish traffic "before and after" construction on Federal Aid Secondary routes, and at selected sites on U. S. numbered routes where established traffic trends indicated abnormal increases or decreases on limited sections of roadway.

Fixed automatic traffic recorders were operated at the established 19 key locations. Traffic passing these stations increased steadily throughout the biennium, and the highest traffic volumes recorded since original installation were during the latter months of the period. Data compiled from the tape recordings of these 19 stations are used to expand short-period counts to yearly averages, thus allowing more complete coverage of the State with counts of short duration.

In 1923 the Department conducted the first of what has since become an annual State-wide manual traffic census, its purpose being the accumulation of historical data on the growth of traffic and on classification of vehicles. Responsibility for the continuation of the census was assigned to the Planning Survey in 1939. A pamphlet entitled "Tabulation of Annual Traffic Census" is published each year, and the tabulations are available for the two studies during the biennium.

The customary January one-day manual counts were again conducted for the purpose of obtaining a correct classification of traffic by vehicle type on a year-round basis. These counts were made at 45 of the July traffic census stations regarded as major road junctions.

The financial section is concerned with three continuing projects, fiscal survey, statistical study, and road-life study.

The fiscal survey consists of the collection of material having to do with income and expenditures of all governmental units below State-level, and the compilation and analysis of that material for ready use in connection with problems concerning the Department's operations.

Information thus obtained is correlated with data from the road-life studies, producing a composite portrayal of income and expenditures and of costs of construction and maintenance—of paramount importance in connection with highway planning and construction.

The statistical set-up is in direct relation to fiscal survey and road-life studies.

Tables and graphs on motor vehicle registration and revenue, and on motor fuel consumption and revenue are also compiled. Comparisons are made by years, and trends forecast for the purpose of estimating probable revenue for future years.

Road-life study embraces collection of factual data on length, width, surface type, year built, improvement and retirement records, investment analyses, annual cost computations, and control sections on State interest roads. These records serve not only as a basic source of information on the outlined items but they also permit a comparison of road deficiencies in relation to design standards for planning long-range construction programs.

The road-life section also rendered assistance in the preparation of enlarged area maps for certain urban sections.

One of the Special Studies undertaken at the request of the American Association of State Highway Officials, had as its purpose an estimate of Federal-Aid System needs as of December 31, 1951. Presentation to the Congress of facts concerning such needs is a major responsibility of the AASHO in connection with appropriations, and the summary submitted by Nevada becomes a part of the over-all picture. The Association's first organized approach to this problem was in 1947, and the recurring demand for sound and reliable estimates has placed the study on a continuing basis. Every two years estimates are made on costs of needed improvements, probable future accrual of needs, and annual costs of reducing the backlog of need in order to achieve a condition of current adequacy for several program periods.

Another Special Activity is that of noting progression of deterioration at certain typical test sections in conjunction with the quarterly

loadometer study. Analyzation includes features such as design; surface type; thickness of surface, base and sub-base; and sub-soil classification.

This study was undertaken in each year of the biennium.

Vehicular turning movement studies, including consideration of prevailing speeds and accident history, are frequent. Such studies play a major role in roadway design and are also important to communities faced with perplexing intersection problems.

Regularly scheduled speed and car occupancy studies were conducted at six selected sites.

Annual truck-weight, or loadometer, studies, were conducted at 10 regular sites. Quarterly studies were designated as a regular function and were conducted at the proper intervals throughout the biennium. High-speed traffic posed a problem at most stations, but cooperation from Nevada Highway Patrol and carefully considered signing were highly instrumental in alleviating accident hazard during operations.

TRAFFIC AND SIGNS

The Department of Traffic and Signs, headed by the Traffic Engineer, is responsible for centerline striping, and the production and placing of signs and traffic control devices on the improved State highway system. Considerable time is devoted to cooperating with cities and counties on their respective traffic problems.

Realizing that the placing of a center stripe constitutes one of the greatest single factors contributing to highway safety, the Department has gradually increased its striping program so that approximately 2,800 miles of highway are now being striped annually, at a cost of \$80,000. White broken lines are used where extra precautions are necessary, where passing is hazardous, such as on curves or on approaches to hills. Yellow is also used in the center on stretches of four-lane highway.

The striping equipment consists of a pusher-type spray machine, capable of laying three lines simultaneously, propelled by a truck upon which are mounted the paint storage tanks. Agitators in the storage tanks keep the paint at proper consistency for spraying. The equipment was specially made by the Equipment Division. In addition, two pickups, equipped with appropriate warning signs and lights, are used to warn approaching traffic of the center striping operation. One pickup travels in front of the spray machine and truck while the other comes behind, moving as the paint dries.

Paint is bought under State specifications and is ready-mixed. The operating speed varies from three to five miles per hour, depending upon the type of roadway and weather conditions. The crew consists of five men with the three vehicles.

Pavement marking is done in accordance with standards recommended by the American Association of State Highway Officials.

All signs, except U. S. Route markers, are manufactured in the Department's sign production shop in Reno. The shop is manned by two sign painters, a spray painter and a stock clerk.

The method of producing our own signs, rather than purchasing, has proven its efficiency, as special signs can be manufactured with

minimum delay, and standard signs are being produced at a considerable saving. All signs are fabricated in accordance with national standards.

The greatest loss of signs is through vandalism—mainly shooting—and amounts to some \$15,000 annually, or about 20 percent of the total sign cost.

With the steady increase in traffic throughout the State, the Department has received numerous requests from cities and towns for per-



Painting signs for the benefit of the traveling public is on mass production in the Highway Department's sign shops in Reno. Some signs are hand painted, while others are machine made, using Scotchlite application. After the signs are fabricated, holes are punched for ease of mounting on sign posts.

mission to install traffic signals upon the State highway system. In order to clarify the Department's position in this respect, it may be well to quote Federal legislation covering traffic control devices. In 1944 when Congress passed legislation providing funds for postwar Federal highway aid, there was included within the Act the following section:

On any highway or street hereafter constructed with Federal aid in any State, the location, form and character of informational, regulatory, and warning signs, curb and pavement or other markings, and traffic signals installed or placed by any public authority, or other agency, shall be subject to

the approval of the State Highway Department with concurrence of the Public Roads Administration, and the Commissioner of Public Roads is hereby directed to concur in such installations as will promote the safe and efficient utilization of the highway.

To supplement the Act, the Commissioner of Public Roads on April 12, 1945, issued a pamphlet entitled "Regulations for Carrying Into Effect the Provisions of the Federal-Aid Highway Act of 1944."

These regulations read in part:

All signs and traffic-control devices and other protective



This machine, designed and fabricated in the Reno Equipment Shops, follows the center line and traffic lanes throughout the State applying both white and yellow pavement markers.

structures, whether paid for from Federal or other funds, erected on or in connection with highways or structures on which Federal funds are expended, shall be in conformity with such manual of uniform traffic control devices as may be adopted by the American Association of State Highway Officials, approved by the State Highway Department, and concurred in by the Commissioner.

A manual, as referred to above, has been approved by the American Association of State Highway Officials and the Commissioner of Public Roads, and has been adopted by this Department. This manual has been given widespread distribution among counties and cities, and

clearly sets forth the requirements or "warrants" that must be met before the installation of a traffic signal is permitted.

Inasmuch as Federal funds have been used in the construction of practically every mile of road built by this Department, these regulations automatically make the Department responsible for seeing that traffic signals are installed only where warrant requirements are met.

BRIDGES AND GRADE SEPARATION STRUCTURES

The flood of November 1950 caused considerable damage to bridges along the Carson River. On the road from Gardnerville to Center-



The morning after the Carson River receded, Dayton Bridge looked like this. On July 7, 1951 the new bridge was dedicated. Three times, 1907 1937, and again in 1950, flood waters of the Carson had washed away structures at this point. This new, high level, reinforced concrete bridge should withstand future rampages of the stream.



ville, two bridges had their approaches washed out and a third had one pier so undermined that it settled about six inches. The pier was jacked into position and additional concrete placed underneath. On the other two structures two spans were added to each, providing more waterway. The total cost of repairing these three bridges was \$26,526.

All five of the timber bridges on State Route 37 (from the Minden Junction south to the State Line), also had approaches washed out. Included in these was the one over the East fork of the Carson River which was damaged beyond repair. This bridge would have required rebuilding in a few years so the flood merely hastened its replacement.

Plans had already been started for replacing the County bridge over the Carson River at Dayton, so, as it was also washed out by the same flood, a new bridge to replace it was constructed early in 1951. The washout of this bridge caused considerable inconvenience to the residents on the east side of the river. The county put up a temporary footbridge which was used until a detour was provided. A celebration dedicating the new bridge was held on July 7, 1951.

The flood damage to bridges across the Truckee River consisted of



The old and new are shown at Glendale over the Truckee River.

washing out portions of approaches to several, and the breaking down of the railing on the Lake Street bridge in Reno.

Five bridges on the interstate system have been widened in our continuing effort to bring them up to modern standards. Of the 14 other bridges on which work was performed during the biennium, only two are on the Federal-Aid Primary system while the other 12 are on the secondary.

Table No. 12 shows 14 bridges as constructed or under construction. Of these, 12 are reinforced concrete and 2 are timber. Eight of the twelve concrete bridges replace county structures which were inadequate. The two timber bridges are county structures, one of which is being widened and the other strengthened. The total cost of the work on bridges during this biennium is estimated at \$551,000.

PUBLIC RELATIONS

This division of the Department of Highways was reactivated at the close of the last biennium. Its reactivation was brought about by the ever increasing need to inform the people of Nevada, how, why, and where approximately nine million dollars of road-user revenue is spent annually. In addition, the traveling public, both native and out-of-State, have demanded up-to-the-minute information concerning road conditions, touring suggestions and answers to other questions concerning Nevada.

This Department also cooperates with local and National touring agencies, newspapers, and radio stations in an effort to forestall false rumors concerning the condition of interstate roads, particularly during the winter months when storm conditions make it necessary to close temporarily our major highways.

With the issuance of regular reports concerning the progress of road construction and repair projects, the Department has provided proper information concerning its expenditures. These reports, distributed monthly to newspapers and road-user organizations, reveal the mileage and dollar volume of jobs advertised, under construction, and completed.

In addition to routine public information assignments, the public relations director is frequently called upon to perform special tasks allied to the Department. During the past biennium these have included a study of on-the-job accidents, a survey to determine the feasibility of a radio communication system for maintenance vehicles, and assistance in the production of a motion picture film highlighting the attractions of the State of Nevada.

Following the study of accidents to personnel, an accident prevention program was prepared and initiated. It is the intent of the program to attempt to reduce the number of accidents, thereby decreasing lost man hours as well as the saving of life and limb of employees.

Late in the biennium, in the midst of the severe winter, it was evident that better communication was necessary between snow removal equipment and division engineers. Neighboring States, experiencing similar hardships to keep roads open for traffic, reported the use of radio as a necessary part of their equipment. An extensive survey was conducted by this Department to obtain the cost of installation and maintenance, and the coverage that could be anticipated. The report was completed and made ready for presentation to the Board of Directors at the close of the biennium. It is hoped that the system will be installed, in part, before the next winter period.

Since there is no State Bureau of Information, or State Chamber of Commerce, mail addressed to these nonexistent agencies is referred to the Highway Department. Requests of this type, numerous in volume, are processed by the Public Relations Department. Since many of these requests are similar in nature, brochures are prepared, printed, and used in the answering of this correspondence.

The Highway Engineer, as ex officio Assistant Civil Defense Director for Transportation, is required to compile and distribute pertinent data concerning the highway system and its place in the Civil Defense

program. Responsibility for this chore has been delegated to the Public Relations Director. In January 1952 an inventory of each U. S. route in the State was completed and presented to the Civil Defense Council. The inventory lists all facilities along the inter-State highways, and this information would, in the time of disaster, be the key to the movement of persons and materials from one State to another, through Nevada.

During the past year, the Department has cooperated extensively in the production of a film entitled, "Nevada, Land of Surprises." Production and distribution costs of this film are being met by a major oil company. This picture, when completed, will be released through the company's distribution plan to an estimated audience of eight to twelve million persons. In addition, numerous showings of the film, "Nevada and Its Natural Resources," which was also produced by a major oil company a few years back, have been made to service clubs, schools, organizations, etc. This picture, incidentally, has been shown in most of the 48 States, and was presented, during the summer of 1951, to a television audience by a Salt Lake television station.

Since the Highway Department subsists wholly on road-user revenue, it is proper that we continue to make Nevada an attractive State for motorists, and the above activities constitute some of the attempts to accomplish that end.

MATERIALS TESTING AND RESEARCH

Details of regular duties of the Materials Testing and Research Division have been fully covered in earlier biennial reports. Repeated here are only principal classifications of these duties. They are: to make field studies of subgrade and roadbed materials (called materials surveys) of all proposed construction projects; to test and evaluate such materials in order to establish proper roadbed design; to check all job-processed materials as they are being produced; to check quality of all prefabricated materials going into construction and maintenance of highways; and to investigate materials "trouble," trying to find a solution and making recommendations relative thereto.

In addition to its regular duties, this division of the Highway Department undertakes certain special investigations or research projects. Such projects serve: to determine causes of trouble which cannot be easily explained; to evaluate different kinds of material for the same or similar use; and, in general, to increase knowledge of the properties and behavior of different kinds of material under conditions found on the highways of the State of Nevada. Mention is made later in this report of some of such projects undertaken during the biennium.

Other duties assigned, although somewhat extraneous to testing of construction materials, are the keeping of official daily U. S. Weather Bureau records for Carson City, supervising chlorination of the State water supply, and acting as correlator on highway landscape projects in absence of a landscape specialist.

A project of major importance, during the past biennium, was changing quarters from the building at Second and Ormsby Streets to the new State Office Building on South Fall. Much time and effort

were spent in making the move from the time the floor space and plans were laid out until the new quarters were completed and all the old, as well as the new, equipment and fixtures were in place and ready for operation.

The new quarters afford more working and storage space than was available before. The laboratory occupies the ground and first floors of the easterly end of the south wing of the new building.

The ground floor houses the concrete and cement testing laboratory, the soils and aggregates laboratories, and a receiving room where incoming samples are sorted, cataloged and channelized for testing. Freight for the entire building is handled in this room which is served by a freight elevator and an outside loading platform.

On the first floor are the chemical laboratory, the asphalt laboratory, a large room used partly for special tests and research and partly for storage, laboratory offices, and a room which serves as a sample file and field equipment storage room as well as a landing for the freight elevator.

A number of pieces of new testing equipment were placed in the new quarters, and most of the cabinet work is new. A major part of the expenditure for new equipment went into modernization of the concrete and cement laboratory. Improvements were also made in the soils, chemical, and research laboratories.

During the biennium, several special investigations were undertaken, some of which have been completed, with some still in progress. Following is a list of these projects:

1. Study of fine aggregate blends to improve concrete in the Reno area (in progress).

2. Use of sodium sulphate soundness tests in evaluating serviceability of concrete pipe in alkali marsh areas. (Completed and reported in *Concrete Pipe News*, February 1952.)

3. Comparison of "cracked" asphaltic fuel oil with portland cement in stabilizing gravel base containing micaceous and clay binders (completed).

4. Study of asphalt film stripping using SC-3 with different mineral aggregates (one phase completed).

5. Quantitative measurement of asphalt-aggregate affinity in presence of water. (Progress report completed. Further work contemplated.)

6. Quality aspects of liquid asphalts through fractionating by solvents. (Preliminary report available. Data turned over to Asphalt Institute for more detailed investigation.)

7. Study of evaporation rates of grade SC-3 asphalt from different sources. (In progress.)

The total number of samples tested during the 1951-1952 biennium in the laboratory at Carson City was 9,519; this total includes all kinds of materials subjected to standard test procedures, but does not include samples or materials used in performing some of the special research projects. Several thousand samples of aggregates and soils requiring control during production were tested in the field laboratories which are set up on jobs requiring such tests. These samples, of course, are not included in the total, 9,519, mentioned above.

Not all of these samples represent materials used in Nevada highway construction or maintenance. The Department laboratory tests materials used in various kinds of construction, and for nominal fees furnishes testing service for various Federal projects, and for city, county, and some private work.

The kind and number of samples tested during the biennium are as follows:

Concrete Materials—

Portland cement.....	108
Coarse aggregate.....	115
Fine aggregate.....	137
Water for concrete.....	6
Concrete cylinders.....	2,038
Curing compounds.....	21
Expansion joint filler.....	26
Concrete building blocks.....	40
Rock for grouted rip rap.....	8

Gravel Base, Gravel Surface and Fill Materials Other Than Soil—

Gravel base and surface (preliminary or pit samples).....	790
Gravel base and surface (finished product).....	826
Screenings and chips for seal coat.....	21
Slag and cinders.....	9
Selected borrow.....	132
Mineral filler.....	2
Drain backfill.....	5

Soils—

Subgrade samples, highways and airports.....	1,901
Top soil overburden on gravel deposits.....	47

Bituminous Materials—

Liquid asphalt, MC-1.....	71
Liquid asphalt, MC-2.....	89
Liquid asphalt, MC-3.....	3
Liquid asphalt, SC-2.....	27
Liquid asphalt, SC-3.....	987
Liquid asphalt, SC-4.....	65
Liquid asphalt, SC-5.....	3
Liquid asphalt, SC-6.....	239
Asphalt cement, penetration grades.....	78
Emulsified asphalt.....	151
Unclassified (such as roofing and waterproofing asphalts).....	21
Bituminous treated aggregate for extraction tests.....	276

Metallic Materials—

Reinforcing steel.....	231
Structural steel.....	5
Mesh reinforcing.....	10
Wire fencing.....	18
Corrugated metal culvert pipe.....	855
Miscellaneous metals.....	2

Miscellaneous—

Creosote for timber preservative.....	13
Paints for timber and metal.....	39
Asphalts for sulphur analyses and special tests.....	12
Vitrified clay sewer pipe.....	2
Perlite.....	2
Facing brick.....	2
Water for special analysis.....	1
Treated aggregate for stabilometer tests.....	50
Cement and asphalt treated soils.....	20
Base and subgrade for CBR.....	9

EQUIPMENT DIVISION

During the biennium conditions governing the purchase of metal parts and supplies were far from satisfactory due to the heavy demand by the government and to a 55-day steel strike which has materially set back delivery dates for parts and equipment.

All equipment purchases were made through the State Purchasing Director for the past year by sending requests and specifications to the Director who in turn advertised for bids.

Automobile prices have soared to an all-time high, so that now there are only a few makes available under the \$2,500 statutory price.

All equipment operated by the Department is adequately maintained in division shops located in Las Vegas, Elko, Ely, Tonopah, and Carson City. Most of the major overhauls, however, are performed at the Headquarters Shop in Reno.

In addition to routine mechanical repairs and overhaul, this Division was responsible for and supervised the following improvements:

1. Enlarging storage garage, building sand storage shed, placing foundation, and setting prefabricated maintenance residence at Spooners.
2. Building and installing lavatory for Carson shop.
3. Building lavatories for Lovelock and Yerington.
4. Removing old prison foundation in south field at Reno Plant and leveling the section for storage and oil mixing.
5. Building 200 feet of new storage sheds in southwest part of the south field at Reno Plant.
6. Setting up equipment repair shop in Carson for maintaining snow removal and maintenance trucks operating in that area.
7. Enclosing section of shed at Reno Plant and installing sandblasting machine for use by Paint Department.
8. Building an 18' x 28' addition to north side of machine shop, east of main repair shop.

The Equipment Division hopes to increase the size of the main shop in Reno and have it completed before winter sets in. The increase in size of the equipment used by the Department makes this necessary.

CONSTRUCTION

During the biennium July 1, 1950, to June 30, 1952, 69 contracts were awarded covering the construction or reconstruction of 648.4 miles of road at a cost of approximately \$10,340,000.

Of these 69 contracts, 38 were completed covering 270.5 miles at a cost of \$4,160,000. Contracts under way but not completed on June 30, 1952, numbered 31 covering 377.9 miles at an estimated cost of \$6,180,000.

In addition to the above, 24 contracts awarded prior to July 1, 1950, covering 180.2 miles at a final cost of \$5,091,000 were completed during this biennium.

During this period the Bureau of Public Roads awarded four contracts providing for the construction of 5.6 miles of road at a total cost of \$395,000. Forest highway funds were used to finance these projects, all of which were in the Lake Tahoe area.

Of those 69 contracts awarded, two covered the construction of 5.8 miles of four-lane divided highway with two 12-foot lanes for traffic in each direction. One contract comprised 3.1 miles between Sparks and Vista in Washoe County, while the other was 2.6 miles in length on U. S. 91 immediately south of Las Vegas. Eight contracts were for the construction of 86.2 miles with plant-mixed asphaltic surface; 31 covered the construction of 358.3 miles of roadmixed asphaltic surface; nine were for gravel surface; three were bridge construction only; and one involved 25.7 miles of Class A1 Surface Treatment, consisting of a heavy seal coat of emulsified asphalt and screenings or stone chips.

Four contracts were for the construction of 86.4 miles of mine access roads in Churchill, Humboldt, Lincoln, Mineral, Nye and Pershing Counties at a total cost of \$12,582. These jobs were financed entirely with Federal access funds.

Three contracts covered the construction of airports at Yerington and Eureka at a total cost of \$79,139. These jobs are financed jointly by the Civil Aeronautics Administration, the Nevada State Airport Fund, and a sponsor, who is usually the city or county, or both.

The other eight contracts covered various items of work such as removal of buildings from right of way, and their reconstruction where necessary; construction of maintenance buildings; fencing; etc. Of these jobs, the largest was the construction of a new maintenance shop and garage buildings at Austin and Winnemucca, at a total cost of \$136,155.

DIVISION ONE

A busy period was experienced by Division One (headquarters in Las Vegas), for the period July 1, 1950, to June 30, 1952.

Twelve contracts were let in this vicinity, totaling \$2,123,316, 10 of which have been completed at a cost of \$1,671,086. This work, coupled with maintenance operations, accounts for all activities in this Division.

One of the most interesting contracts, and unique in highway construction in this State, was the four-lane divided highway between Oakey Boulevard in Las Vegas, and the Flamingo Hotel on U. S. 91. Division of the four lanes was accomplished by the construction of a median strip 20 feet in width, and this design also afforded 10-foot storage lanes to accommodate traffic making left-hand turns.

Also in connection with this construction, the most modern in traffic signal installations was erected at the intersection of South Main and South Fifth Streets. This system is traffic-actuated, affording the greatest possible vehicular movement at this intersection.

Considerable revamping of maintenance installations in Division One has been done and work is still under way on the construction of the yard and garage at Beatty. It was decided to transfer the Lathrop Wells maintenance station to Beatty to centralize our operations. Two houses at Lathrop Wells were moved, one to Indian Springs to replace a substandard cabin, and the second was installed in the Las Vegas oil yard for the temporary use of the Drivers License Division of the Public Service Commission. It is anticipated this house will eventually be used at Mountain Springs summit when it becomes necessary to install a maintenance crew in that area.

A site approximately 400'x500' facing U. S. 95, was obtained for

a maintenance station and garage in Beatty. The construction of the new garage and storage sheds is under way, one item of interest being the wall erection. Wall sections are of concrete composed of local sand and cinders to reduce weight. They are formed and poured on the previously placed concrete floor, then raised into place with a power shovel. The wall sections are then connected with poured pilasters and a poured bond beam.

Some 20 miles of U. S. 93, from Glendale toward Alamo, have been widened four feet with mixed-in-place roadmix.

A heavy seal with screenings was applied on U. S. 91 from North Las Vegas to Nellis Field. This section was badly cracked and surface treatment was necessary due to the traffic volume. Eight-foot shoulders on each side were treated with the same oil application but red cinders were used for the cover coat, giving a line of demarcation between the plantmix and the shoulders. This demarcation has somewhat halted the hazardous tendency of making a four-lane highway of this section.

Material deposits in Clark County are becoming of greater value yearly. A "claim jumper" had refused our maintainers access to a previously used deposit, but he was later convinced of the validity of the State's title. The deposit nearest to Las Vegas draws envious attention from local contractors and some trouble has been experienced in protecting State-owned material from overly ambitious haulers.

Some landowner improvements along The Strip have been made in such manner as to block natural drainage channels, but through the cooperation of the city of Las Vegas and Clark County the Department anticipates little trouble of the nature in the future.

Cloudburst damage has not been heavy in this Division recently with the exception of one troublesome channel in the Mt. Charleston area.

A $\frac{3}{4}$ -yard Northwest Shovel and a $\frac{3}{8}$ -yard Quick Way shovel with a back hoe attachment mounted on an old F. W. D. chassis have been obtained. These two units give a well balanced excavating setup for our needs.

DIVISION TWO

Division Two, with headquarters in Reno, includes that portion of the State Highway system within Churchill, Douglas, Lyon, Ormsby, Storey and Washoe and portions of Lander, Mineral, and Pershing Counties, a total of 934 miles.

Construction work in Division Two, for the biennium, consisted of approximately 86.71 miles on secondary and 55.17 miles on primary routes, at a cost of approximately \$2,539,000.

The Federal-Aid Secondary contracts during the biennium were as follows:

Bafford Lane and Harmon Lane near Fallon, a length of 2.05 miles, including a concrete bridge on each lane, at a cost of \$122,420.

Mine access road from a junction near Frenchman's Station on U. S. 50 to 20 miles south near the Nevada Scheelite Mine. This contract was built on a complete equipment rental basis for the sum of \$26,781.

Foothill Road from Scossa Ranch to Genoa, a length of 9.04 miles, at a cost of \$154,228.



It may appear pretty as a picture to the passing motorist, but to the operator in the cab it is nothing more than tough, tedious work.





The flooding Truckee, November 1950, looked like this (above) at Vista. The same area was again covered with water by the flooding Truckee in the spring of 1952.





Virginia Street Bridge as the flooding Truckee waters recede in November 1950.



Center Street Bridge in Reno looked like this after the Truckee overflowed its banks in November 1950.



A new coat called "Virginia Mix" is applied to South Virginia Street in Reno.



Sealing the "Virginia" or open mix.





Travel on U. S. 395 north of Minden, over Cradelbaugh Bridge, was somewhat hazardous. Highway maintenance trucks acted as pilots so that cars would avoid running off the road.



Culverts such as these were repaired and enlarged on S. R. 56.



Centerville to Gardnerville, consisting of repairs to one concrete bridge and enlarging the capacity of two others, \$29,755.

On route 37, removing old timber bridge, constructing new reinforced concrete bridge and approaches, \$70,686.

LYON COUNTY

From a junction with U. S. 50 in Dayton to one-quarter mile east, including a reinforced concrete bridge for \$84,952.



November 1950. Swift waters of the Carson River flooding from general rainfall along the east slope of the Sierra, filling all the tributaries to the Carson, cut U. S. 95 Alternate at Weeks Crossing.

From a point approximately three miles southeast to a point one-half mile northeast of Mason, a distance of 3.03 miles, for \$69,877.

Construction and reconstruction of Yerington Municipal Airport for \$54,789.

ORMSBY COUNTY

Carson River Bridge to a junction with the Prison Road, also from a junction with U. S. 395 north of Carson City to a junction with U. S. 50 at New Empire (including a spur to the Carson Airport) a length of 5.9 miles, for \$145,785.

PERSHING COUNTY

Two sections of road located two miles north of Lovelock and seven miles south of Lovelock, respectively, a total length of 4.11 miles, for \$104,274.

From a junction with U. S. 40 near Mill City to Nevada-Massachusetts Tungsten Mine, a distance of 7.8 miles, for \$155,595. Due to extreme high water in the Humboldt River in the early spring this contract has been suspended since June 12, 1952, and work will not be resumed until sometime in August.



November 1950. Heavy rains fell on the east slope of Slide Mountain, causing sand slides to fill Ophir Creek. The culvert carrying Ophir Creek water under U. S. 395 soon filled with sand and rock and overflowed, causing the washout as shown in the upper left corner. It took highway crews the better part of a week before the road was open to controlled traffic.

STOREY AND WASHOE COUNTIES

Clark Station to a junction with U. S. 40, including a reinforced concrete bridge for \$78,013.

WASHOE COUNTY

Route 27 from Grass Lake at the Ski Bowl to Galena Creek, a distance of 5.14 miles, \$61,574.

From Mill Street, east of Reno, to Glendale Road, including a reinforced concrete bridge, for \$143,114.

Nixon north to near the Gypsum Plant at Empire, a distance of

26.8 miles, for \$83,284. Kietzke Lane from a junction with U. S. 395 south of Reno to the Airport Road, a distance of 1.19 miles, for \$112,134. This contract was not completed during this biennium.

Contracts of primary or regular Federal-Aid Routes during the biennium were as follows:

CHURCHILL AND LYON COUNTIES

One-quarter mile east of Fernley Overpass on U. S. 40 to a point approximately nine miles east of the Lyon-Churchill County line, a length of 21.85 miles, 40-foot plantmix surface, for \$553,530.



High water and its accompanying force caused the Church Bridge at Gardnerville to settle.

CHURCHILL COUNTY

Nine miles northeast of Lyon-Churchill County line to Churchill-Pershing County line, a length of 18.47 miles, 40-foot plantmix surface for \$353,987. This contract was completed this biennium.

DOUGLAS COUNTY

Junction of S. R. 28 to a point 1 mile east of Spooners Summit, a length of 1.58 miles, for \$166,456. Contracts will not be completed this biennium.

WASHOE COUNTY

On U. S. 395 south of Reno from Huffakers to Hash Lane, a distance of 2.5 miles, 68-foot plantmix surface with a 4-foot median strip for \$353,203.

Sparks to Vista on U. S. 40, a length of 3.14 miles, a 72-foot roadbed

(dual 36-foot) plantmix surface for \$599,054. Due to the severe winter causing extreme high water in the Truckee River this early spring, work had to be suspended for a total of three and one-half months, thereby preventing the completion of the contract during this biennium.

Through the cities of Reno and Sparks on U. S. 40 and U. S. 395, an open-graded plantmix surface was placed over the existing surface from curb to curb. The length of this project was 7.63 miles, costing \$274,984. This type of surface has proven to be very sturdy under severe winter conditions.

Maintenance work in Division Two included resurfacing of 53 miles, sealing and sanding 50 miles, and sealing and screening 19.5 miles of roadway.

New standard maintenance station buildings were completed in Gardnerville and Wellington and modern sanitary facilities were provided in Lovelock and Yerington.

Snow removal in Division Two during the winter of 1951 and 1952 was of unprecedented proportions. At times some of the drifts were so deep that a cat and bulldozer were used ahead of rotary plows to expedite snow and ice removal.

DIVISION THREE

Division Three, with headquarters in Elko, maintains 746 miles of State highway in Elko, Humboldt and the northern part of Lander, Eureka and Pershing Counties. During the past two years, 12 road contracts were awarded at a cost of \$1,855,000.

Construction on primary system in Elko County was from Cliffside to four miles west of Wendover. This section of road was built 175 feet south of the old pavement and the old road was used to carry the traffic while the new section of road was being built.

The section from Elko to eight miles west will be converted from a 30-foot roadway to 40-foot plantmix surface at a cost of \$245,000.

Two bridges and two overpasses were widened near Deeth at a cost of \$71,000.

A seal and screenings contract of 26 miles in Humboldt and Lander Counties from the east foot of Golconda Summit to Battle Mountain was awarded on June 19, 1952, amounting to \$51,000.

Work on secondary roads in Elko County consisted of the construction of a new concrete bridge on the Owyhee River, and a section of road from Jiggs to the south fork of the Humboldt River, including a concrete bridge.

In Humboldt County the secondary system was extended northerly from a point 30 miles south of Denio to 14 miles south of Denio, a length of 16 miles, at a cost of \$230,000.

In Winnemucca a new maintenance shop was erected consisting of four small rooms (parts room, boiler room, office and laboratory), four storage stalls, one wash and one grease room, all heated.

Contracts started during the biennium but not completed by July 1, 1952, were those from Jiggs north to the south fork of the Humboldt River, oiling of 17.6 miles of secondary road through Taylor Canyon and, in Lander County, a 28-mile section south of Battle Mountain

which is under contract and should be completed to an oil surface before November.

The personnel in Division Three averages about 55 men, not including the survey crews.

The maintenance force, with a swing crew, placed seal and screenings on 20 miles of U. S. 40. About 15 additional miles have been reconditioned, 75 miles of roadmix surface sealed and sanded, and about 30 miles of invert have been placed on the four-foot outside edge.

The winter of 1951-1952 proved to be one of the worst in the Divi-



High waters of the Humboldt River during the spring of 1951 caused the residents of Winnemucca to have some concern for the Winnemucca Bridge on U. S. 95.

sion's history. To handle snow removal, this Division used one rotary, three all-wheel-drive trucks with V-plows and straight blades, and two small trucks with straight blades, located at Elko; one large truck with V-plow and straight-blade plow, and also one rotary (which was destroyed by fire April 1, 1952), at Wells; and at North Fork, 45 miles north of Elko, we had a rotary and an all-wheel-drive truck with V- and straight-blade plows. These are the three stations where the major snow problems are encountered.

DIVISION FOUR

Division Four, with headquarters (or office) located in East Ely, includes the improved State Highway system in White Pine County and a portion in Elko, Eureka, Lincoln and Nye Counties, a total of 806.7 miles.

During the biennium, July 1, 1950, to June 30, 1952, the following construction was completed by contract with Federal-Aid and State funds:

ELKO COUNTY

9.9 miles on U. S. 50 from the Elko-White Pine County line to 1½ miles North of Boone Springs.

EUREKA COUNTY

30.1 miles on State Route 20, from Garden Pass to 30 miles South of Palisade.

LINCOLN COUNTY

10.5 miles on State Route 25, from 10 miles East of Panaca to the Nevada-Utah State line.

11.5 miles on State Route 83 from 5 miles South of the Comet Coalition Mine to the Caselton Mill.

14.2 miles from Pioche to Ursine.

4.7 miles from 5 miles South of Pioche to the Prince Mine.

WHITE PINE COUNTY

18.0 miles on U. S. 50, from 15 miles North of Magnuson's Ranch to the White Pine-Elko County line.

18.0 miles in Spring Valley, from Cleve Creek to Piermont Creek.

This makes a total of 117 miles of roadway constructed during this period.

At the present time, there are under construction, 25.6 miles of grading and gravel surface, and 18 miles of surfacing.

Under contract with State funds, 7.1 miles of road surface were sealed and chipped. There were 55 miles on U. S. 93 from Lage's Station to Warm Springs, and 16 miles on U. S. 50 from Magnuson's Ranch to 16 miles north. The contractor furnished the asphalt, while the chips were made by the Division Four maintenance swing crew.

During the biennium, heavy seal and chips have been placed on approximately 72 miles of roadway by the Division maintenance crews.

Division Four maintains 806.7 miles of highway. Of this mileage, all but about 80 miles will be hard-surfaced by the fall of 1952.

There are 11 maintenance stations in this division, including the headquarters at East Ely. Crews from these stations maintain from 50 to 100 miles, the mileage depending on the type of maintenance required. Approximately 90 miles of road are maintained from the headquarters station at East Ely. There are four main highways leading out of Ely and the heaviest traffic in the division is in that area.

A swing crew, with headquarters in East Ely, is used on all sections within the division and is employed on snow removal, washouts, sealing and sanding, and reconditioning of old surfaces.

The winter of 1950-1951 was comparatively mild and there were

very few bad snow conditions, and only a small amount of surface break-up in the spring; however, the winter of 1951-1952 was very different. During that winter there was a very heavy snowfall with high winds and temperatures as low as 26 degrees below zero for a period of about two months. Crews worked around the clock for days at a time. There were only a few days at any one time when the roads were blocked on account of snow, and that was mostly between Ely and Eureka where there were continuous high winds. The roads would be open one day and blocked the next with drifting snow. Roads between Ely, Ruth, Kimberly and McGill were kept open with very little delay during the bad weather, but it required 24-hour operations to do so.

The break-up of pavement in the spring of 1952 was very extensive due to the hard winter. The maintenance crews have been patching and reconditioning since the snow was removed from the road. Several thousand cubic yards of patching material have been placed on the roads this spring and there is still some patching left to do.

An equipment repair shop, a blacksmith shop, and a sign and paint shop are maintained in East Ely, and most of the repair work for the division is done there. There are three mechanics, one blacksmith, and two painters.

Division Four received six new three-cubic-yard dump trucks during the last biennium.

DIVISION FIVE

Division Five, with headquarters at Tonopah, maintains approximately 775 miles of highway in Esmeralda, Lander, Mineral and Nye Counties.

Ten construction contracts were let during the biennium, amounting to \$1,369,000. Eight of these were complete and the remaining two were 90 percent completed at the end of the biennium.

On maintenance, 13 miles of highway were widened and reconditioned, 75 miles were sealed, and 26 miles were sealed and screenings applied. For the above-mentioned betterment work, a total of 13,000 cubic yards of gravel, 2,500 cubic yards of sand, 2,900 cubic yards of screenings, and 3,200 cubic yards of oilmix material were produced by the maintenance swing crew. Along with this, 490,000 gallons of liquid asphalt of all types were used, 2,500 new culvert markers and guide posts, and 1,000 new snow markers. Approximately 2,000 markers have been repainted in the field and over 250 roadway signs replaced. Most of those replacements were due to malicious shooting of the signs.

A new and modern maintenance station of concrete block and steel construction, complete with a furnace, hoist and diesel electric plant, was constructed at Austin. The construction of this station was justified during the past severe winter, as evidenced by the low rate of equipment breakdowns in this area.

A new spring was found and developed, and additional storage tanks placed at the Rattlesnake Maintenance Station, to alleviate the water shortage. One maintenance house at Basalt and one at Fish Lake Valley were repaired and remodeled. Land has been purchased and the fence and the plans are almost complete for the construction

of a new maintenance station in Mina. When this station is completed, it is planned to abandon those now located at Coaldale and Luning.

A roadside park has been started at Millers Station, 14 miles west of Tonopah on U. S. 95. To date, trees have been planted, driveways constructed, and the water system is now being improved.

Cloudbursts during the past two years have not been particularly troublesome, with the exception of two instances: one on State Route



July 20, 1951, U. S. 95 looked like this the morning after an hour-long cloudburst fell upon the northeast slope of Mt. Grant just north of Hawthorne on the shores of Walker Lake. Maintenance crews constructed a detour around the point pictured above, where the oiled pavement was covered with more than 10 feet of soft, running muck. Almost three weeks went by before the entire section was restored to clean pavement and cleared shoulders.

23, 10 miles north of Gabbs, and one near the cliff section around Walker Lake on U. S. 95.

Snow conditions of the past two years have been more or less normal, except for last winter at Austin Summit on U. S. 50, and Mt. Montgomery Pass on U. S. 6. Storm conditions on these two passes required extra work, but in most instances there was very little delay to traffic.

One of the greatest obstacles to the operation of the division during the past biennium was the personnel situation. The normal number of employees is 55. However, in the past two years over 29 have resigned or were discharged, showing more than a 50 percent turnover.

At the present time there are 23 employees with less than two years service. This continual turnover, and the difficulty in hiring satisfactory new employees, is probably the greatest disturbance to operations.

Land has been acquired and a tentative set of plans completed for the construction of a new shop and office building in Tonopah. A new office and shop are badly needed in this division.

In the past two years the following equipment has been replaced: one sedan, three pickups, one suburban carryall, one four-wheel drive truck, and one motor patrol. The division acquired, as new equipment: two pickups (one with four-wheel drive), two four-wheel drive trucks, one crane truck, one rotary snow plow, one scoopmobile loader, one motor grader, and two small oil distributors.

APPENDIX

TABLE NO. 1
STATEMENT OF RECEIPTS

Classification	1917-1950	1951	1952	Total	Percentage
Legislative appropriation	\$40,000.00			\$40,000.00	0.03
State tax levy	1,869,468.87			1,869,468.87	1.34
Auto license fees	6,121,960.71			7,316,920.23	5.24
Gasoline and use fuel tax (gross)	32,618,051.95	\$520,428.24	\$674,531.25	39,688,021.00	28.41
Common carrier license	6,733,310.85	3,253,439.80	3,796,529.25	9,117,335.26	6.53
Driver's license	446,458.08	1,078,626.92	1,299,397.49	578,681.21	.41
Certificate of title	44,509.05	80,847.06	51,376.07	44,509.05	.03
Racing Commission fees	147,428.86			147,428.86	.11
Contractor's license	16,234.23			16,234.23	.01
Miscellaneous	1,412,091.84	50,866.55	164,897.83	1,627,856.22	1.17
State Highway bonds	1,900,000.00			1,900,000.00	1.36
Federal participation on construction	64,811,187.10	4,068,205.45	3,322,297.52	72,201,690.07	51.70
County participation on State maintenance	4,129,947.87		2,000.00	4,129,947.87	2.95
County participation on county maintenance performed by State	59,000.00			59,000.00	.04
Lincoln Highway participation on construction	116,654.73			116,654.73	.08
Utah-Nevada-California Association participation on construction	71,426.60			71,426.60	.05
San Francisco-Bay City participation on construction	23,831.47			23,831.47	.02
City participation on construction	25,000.00			25,000.00	.02
Railway participation on grade-crossing construction	478,019.76	22,802.86		500,822.62	.36
	169,088.39	27,965.00		197,053.39	.14
Totals	\$121,239,670.39	\$9,103,181.88	\$9,311,029.41	\$139,644,881.59	100.00

TABLE NO. 2
STATEMENT OF DISBURSEMENTS

Classification	1917-1950	1951	1952	Total	Percentage
Construction work	\$82,612,322.06	\$5,322,320.32	\$4,774,847.50	\$92,709,490.88	66.82
Surveys, plans, estimates, and right of way	229,269.33	470,008.53	623,912.36	1,323,190.12	4.56
General maintenance	19,446,201.30	1,620,297.11	2,256,174.39	23,322,672.80	16.78
County maintenance	114,846.30			114,846.30	.08
Maintenance buildings	368,897.15	153,657.23	78,076.92	599,631.30	.43
Equipment divisions and plants	352,902.01	275,713.01	65,788.37	694,403.39	.50
Accounts receivable	1,311,923.35		158,363.60	1,470,286.95	1.09
Section "31" refunds	40,107.77			40,107.77	.03
County highway bond redemption	232,168.01			232,168.01	.17
Laboratory building	125,000.00			125,000.00	.09
State Office Building, transfer of funds		100,000.00	60,000.00	160,000.00	.12
State Office Building, moving charges		423.04	9,153.99	9,576.03	.01
General administration	3,233,462.96	232,630.03	278,128.34	3,744,221.33	2.71
Highways and Parks Magazine	166,875.34	30,107.60	34,746.24	231,729.18	.17
Public relations	13,296.44	19,411.22	18,693.07	51,400.73	.04
Road maps	29,160.77			29,160.77	.02
Road information	14,666.39			14,666.39	.01
Roadside improvement	19,851.05	11,086.56	10,842.83	41,780.44	.03
July, traffic count	164,470.37			164,470.37	.12
Public Service Commission, salaries	3,400.00	10,346.83	10,172.60	23,919.43	.18
Public Service Commission, Safety Division	79,870.33	5,195.58	6,800.00	91,865.91	.68
Public Service Commission, Highway Patrol	454,483.52	142,701.08	14,989.23	612,173.83	4.48
Public Service Commission, Drivers License Division	466,173.17	26,316.01	169,988.11	662,477.29	4.86
Public Service Commission, Motor Vehicle Division	37,526.18	38,655.00	68,408.74	144,590.92	1.06
Public Service Commission, Inspectors	545,529.82		67,932.04	613,461.86	4.45
Common Carrier and truck refunds	29,666.45	165.50	949.00	30,781.95	.22
Gasoline and use fuel tax refunds	2,184,259.42	163,558.05	19,413.66	2,367,231.13	17.33
Gasoline tax administration	107,098.96	8,219.27	9,745.77	125,064.00	.91
Use fuel tax administration	59,328.34	6,375.75	10,381.85	76,085.94	.56
Research and investigation	208,966.57	142,099.69	153,091.04	504,157.30	3.68
Totals	\$120,845,385.66	\$8,829,856.59	\$9,076,801.86	\$138,752,044.11	100.00
Transfer to Revolving Fund	92,452.02			92,452.02	
Reconciliation—					
Total receipts	\$120,937,837.68	\$8,829,856.59	\$9,076,801.86	\$138,844,496.13	
Total disbursements				138,844,496.13	
State Highway balance July 1, 1952			\$800,385.46	\$800,385.46	
Lists filed July 5, included in disbursements			952,117.41	952,117.41	
State Controller's balance July 1, 1952			\$1,752,502.87	\$1,752,502.87	

TABLE NO. 3
STATEMENT OF RECEIPTS AND DISBURSEMENTS FOR THE PERIOD
JULY 1, 1950, TO JUNE 30, 1952

RECEIPTS	1951	1952	Total	Per-centage
Federal-aid	\$4,068,205.45	\$3,322,297.52	\$7,390,502.97	40.13
County and others	50,767.86	2,000.00	52,767.86	.29
Miscellaneous	50,866.55	164,897.83	215,764.38	1.17
Gasoline and use fuel tax (gross)	3,253,439.80	3,796,529.25	7,049,969.05	38.29
Auto license fee	520,428.24	674,531.25	1,194,959.49	6.49
Common carrier license	1,078,626.92	1,299,397.49	2,378,024.41	12.91
Driver's license	80,847.06	51,376.07	132,223.13	.72
	\$9,103,181.88	\$9,311,029.41	\$18,414,211.29	100.00
DISBURSEMENTS				
General administration	\$232,630.03	\$278,128.34	\$510,758.37	2.85
Special traffic surveys	10,346.83	10,172.60	20,519.43	.11
Road maps	11,086.56	10,842.83	21,929.39	.12
Highways and Parks Magazine	30,107.60	34,746.24	64,853.84	.36
Public relations	19,411.22	18,693.07	38,104.29	.21
Public Service Commission, salaries	3,400.00	6,800.00	10,200.00	.05
Public Service Commission, Safety Division	5,795.58	14,989.23	20,784.81	.12
Public Service Commission, Highway Patrol	142,701.08	169,988.11	312,689.19	1.75
Public Service Commission, Driver's License Division	26,316.01	68,108.74	94,424.75	.53
Public Service Commission, Motor Vehicle Division	38,655.00	67,932.04	106,587.04	.60
Common carrier and truck refunds	165.50	949.00	1,114.50	.01
Gasoline and use fuel tax refunds	163,558.05	194,113.66	357,671.71	2.00
Gasoline tax administration	8,219.27	9,745.77	17,965.04	.10
Use fuel tax administration	6,375.75	10,381.85	16,757.60	.09
Maintenance work	1,620,297.11	2,256,174.39	3,876,471.50	21.65
Surveys, plans, estimates, right of way	470,008.53	625,212.56	1,095,221.09	6.12
Equipment divisions and plants	279,713.04	65,788.37	345,501.41	1.93
Maintenance buildings	151,657.23	78,076.93	229,734.16	1.28
Highway construction work	5,322,320.32	4,774,847.50	10,097,167.82	56.39
State Office Building, transfer	100,000.00	60,000.00	160,000.00	.89
State Office Building, moving charges	423.04	9,155.99	9,579.03	.05
Research and investigation	142,099.69	153,091.04	295,190.73	1.65
Miscellaneous	44,569.15	158,863.60	203,432.75	1.14
Totals	\$8,829,856.59	\$9,076,801.86	\$17,906,658.45	100.00

TABLE NO. 4
FEDERAL-AID ALLOTMENTS

1921	and prior—Regular	\$3,527,276.18
1922	Regular	953,436.78
1923	Regular	635,624.52
1924	Regular	826,360.27
1925	Regular	917,623.25
1926	Regular	956,576.00
1927	Regular	948,318.00
1928	Regular	948,510.00
1929	Regular	957,995.00
1930	Regular	960,375.00
1930	Public lands	588,914.00
1931	Regular	1,601,408.00
1931	Unused portion Hawaii allotment	4,288.00
1931	Advance	904,961.83
1932	Regular	1,598,987.00
1932	Public lands	440,683.00
1933	Regular	1,421,688.63
1933	Emergency	1,575,756.00
1934	National recovery	4,545,917.00
1935	National recovery	2,302,356.00
1935	Public lands	542,125.00
1936	Regular	1,595,501.00
1936	Public lands	553,135.00
1936	Works program highway	2,243,074.00
1936	Works program grade-crossing elimination	887,260.00
1937	Regular	1,593,978.00
1938	Regular	1,632,385.00
1938	Secondary highways	326,477.00
1938	Grade-crossing elimination	250,000.00
1938	Public lands	560,201.00
1939	Regular	1,590,172.00
1939	Secondary highways	318,034.00
1939	Grade crossing	243,750.00
1939	Public lands	559,895.00
1940	Regular	1,275,938.00
1940	Secondary highways	191,391.00
1940	Grade crossings	97,500.00
1940	Public lands	212,442.00
1940	Regular (reapportioned from other States)	6,718.00
1940	Secondary (reapportioned from other States)	690.00
1940	Grade crossings (reapportioned from other States)	781.00
1941	Regular	1,462,071.00
1941	Secondary highways	190,705.00
1941	Grade crossings	146,250.00
1941	Public lands	436,062.00
1941	Regular (reapportioned from Georgia)	4,919.00
1941	Secondary (reapportioned from Georgia)	738.00
1941	Grade crossings (reapportioned from Georgia)	358.00
1942	Regular	1,274,718.00
1942	Secondary highways	223,076.00
1942	Grade crossings	97,500.00
1942	Public lands	310,692.00
1943	Regular	1,275,386.00
1943	Secondary highways	223,193.00
1943	Grade crossings	97,500.00
1943	Strategic net	318,847.00
1943	Advance engineering	127,539.00
1946	Regular	2,868,043.00
1946	Secondary highways	1,921,867.00
1946	Urban	60,613.00
1947	Regular	2,868,649.00
1947	Secondary highways	1,922,269.00
1947	Urban	60,613.00
1948	Regular	2,829,804.00
1948	Secondary highways	1,896,250.00
1948	Urban	59,836.00
1950	Regular	2,564,998.00
1950	Secondary highways	1,718,707.00
1950	Urban	53,853.00
1951	Regular	2,562,973.00
1951	Secondary highways	1,717,361.00
1951	Urban	53,853.00
1952	Regular	2,885,661.00
1952	Secondary highways	1,928,291.00
1953	Urban	92,917.00
1953	Regular	2,863,524.00
1953	Secondary highways	1,913,466.00
1953	Urban	92,199.00
Subtotal		\$80,453,802.46

TABLE NO. 4—Continued.

OTHER FEDERAL FUNDS UTILIZED

Access roads funds	\$1,958,757.90
Flight strips (Special)	629,621.09
Flight strips (Regular)	572,576.82
Subtotal	\$3,160,955.81
Total	\$83,614,758.27

TABLE NO. 5

MAINTENANCE—FISCAL YEAR ENDING JUNE 30, 1951**Mileage by Road Types**

		Miles	Percent
1. Earth		6.2	0.17
Unimproved			
Graded and drained	6.2		
2. Gravel		303.9	8.10
3. Mixed bituminous		3,377.4	90.06
Roadmix	2,655.6		
Plantmix	721.8		
4. Other hard surface		62.6	1.67
Portland cement concrete	4.7		
Bituminous concrete	4.2		
Bituminous penetration	13.8		
Combination	1.8		
Bituminous surface-treated	38.1		
Total		3,750.1	100.00

Mileage by Systems

1. Federal-aid Primary		2,205.6	58.81
Rural	2,155.7		
Urban	49.9		
2. Federal-aid Secondary		1,429.1	38.11
Rural	1,419.9		
Urban	9.2		
3. State System		115.4	3.08
Rural	112.1		
Urban	3.3		
Total		3,750.1	100.00

TABLE NO. 6

MAINTENANCE—FISCAL YEAR ENDING JUNE 30, 1952**Mileage by Road Types**

		Miles	Percent
1. Earth		6.2	0.17
Unimproved			
Graded and drained	6.2		
2. Gravel		283.6	7.52
3. Mixed bituminous		3,418.2	90.65
Roadmix	2,696.4		
Plantmix	721.8		
4. Other hard surface		62.6	1.66
Portland cement concrete	4.7		
Bituminous concrete	4.2		
Bituminous penetration	13.8		
Combination	1.8		
Bituminous surface-treated	38.1		
Total		3,770.6	100.00

Mileage by Systems

1. Federal-aid Primary		2,205.6	58.49
Rural	2,155.7		
Urban	49.9		
2. Federal-aid Secondary		1,449.6	38.45
Rural	1,440.4		
Urban	9.2		
3. State System		115.4	3.06
Rural	112.1		
Urban	3.3		
Total		3,770.6	100.00

TABLE NO. 7

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL
ROADS MAINTAINED BY THE DEPARTMENT, FISCAL YEAR END-
ING JUNE 30, 1951.

Operation	Expendi- tures	Per- centage
Patching holes, ruts, and spot sealing	\$286,477.33	17.68
Dragging, blading, reshaping, etc.	44,103.72	2.72
Filling, trimming expansion joints and cracks	491.94	.03
Applying light seal and blotter or chips	42,902.76	2.65
Sand, gravel, crushed stone replacement	6,188.33	.38
Reprocessing bituminous surfaces	47,664.35	2.94
Bituminous surface treating, heavy chips, seal, etc.	130,248.94	8.04
Patching, dragging, blading shoulders and approaches	179,868.78	11.10
Bituminous treatment of shoulders	41,991.51	2.59
Construction of new approaches	5,224.65	.32
Reprocessing bituminous shoulder surfaces	8,126.67	.50
Repairing of cuts, fills, and slopes	98,585.61	6.08
Cleaning and retrenching drains, channels, etc.	84,664.02	5.23
Removal of debris	150,980.52	9.32
Roadside development, landscaping projects	7,283.73	.45
Repair and maintenance of sidewalks, retaining walls, etc.	17,976.09	1.11
Repairing, repainting, resetting markers, signals, etc.	117,854.90	7.28
Traffic lane and center striping	77,094.14	4.76
Repair and maintenance of guard rails	9,241.63	.57
Highway, bridge, and approach lighting	158.42	.01
Comfort station, picnic grounds operation	4,219.37	.26
Traffic and pedestrian crossing markings	4,055.41	.25
Patrolling for protection of public	14,460.16	.89
Erection and removal of snow fence, markers, etc.	13,619.55	.84
Snow and ice removal	86,917.21	5.37
Sanding icy surfaces	21,029.68	1.30
Opening waterways and gutters, due to snow and ice	1,191.13	.07
Removal of sand drifts	1,655.15	.10
Maintaining road blockades during storms	225.51	.01
Cleaning and opening channels	3,920.00	.24
Repairs to structures	3,008.79	.19
Painting and linseed oil treatment to structures	1,685.57	.10
Pumping plants and electricity in structures	2,544.71	.16
Bridge inspections	1,945.12	.12
Extraordinary repairs due to catastrophe	86,222.75	5.32
Total direct expenditures	\$1,603,828.15	98.98
Maintenance administration (Headquarters)	16,468.96	1.02
Totals	\$1,620,297.11	100.00
Average cost of maintenance per mile (Including snow removal)	432.07	
Average cost of maintenance per mile (Excluding snow removal)	399.33	

TABLE NO. 8
EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL
ROADS MAINTAINED BY THE DEPARTMENT, FISCAL YEAR END-
ING JUNE 3, 1952.

Operation	Expendi- tures	Per- centage
Patching holes, ruts, and spot sealing	\$384,442.39	17.04
Dragging, blading, reshaping, etc.	29,661.70	1.31
Filling, trimming expansion joints and cracks	3,050.62	.14
Applying light seal and blotter or chips	136,813.73	6.06
Application of dust palliatives	260.65	.01
Sand, gravel, crushed stone replacement	14,657.46	.65
Reprocessing bituminous surfaces	69,243.52	3.07
Bituminous surface treating, heavy chips, seal, etc.	173,886.98	7.71
Patching, dragging, blading shoulders and approaches	168,386.29	7.46
Bituminous treatment of shoulders	34,124.04	1.51
Construction of new approaches	3,607.53	.16
Reprocessing bituminous shoulder surfaces	6,011.15	.27
Repairing of cuts, fills, and slopes	93,908.52	4.16
Cleaning and retrenching drains, channels, etc.	68,043.20	3.02
Removal of debris	136,832.63	6.06
Roadside development, landscaping projects	10,390.53	.46
Repair and maintenance of sidewalks, retaining walls, etc.	11,949.36	.53
Repairing, repainting, resetting markers, signals, etc.	92,824.33	4.11
Traffic lane and center striping	82,386.96	3.65
Repair and maintenance of guard rails	6,234.21	.28
Highway, bridge, and approach lighting	163.17	.01
Comfort station, picnic grounds operation	2,662.11	.12
Traffic and pedestrian crossing markings	4,080.49	.18
Patrolling for protection of public	17,609.57	.78
Erection and removal of snow fence, markers, etc.	13,863.59	.61
Snow and ice removal	550,977.56	24.42
Sanding icy surfaces	31,929.86	1.42
Opening waterways and gutters, due to snow and ice	6,429.26	.29
Removal of sand drifts	162.61	.01
Maintaining road blockades during storms	6,153.14	.27
Cleaning and opening channels	2,614.97	.12
Repairs to structures	5,355.03	.24
Painting and linseed oil treatment to structures	482.37	.02
Pumping plants and electricity in structures	2,258.89	.10
Bridge inspections	1,356.16	.06
Extraordinary repairs due to catastrophe	58,738.10	2.60
Total direct expenditures	\$2,231,552.68	98.91
Maintenance administration (Headquarters)	24,621.71	1.09
Totals	\$2,256,174.39	100.00
Average cost of maintenance per mile (Including snow removal)	598.36	
Average cost of maintenance per mile (Excluding snow removal)	438.38	

TABLE NO. 9
MAINTENANCE COSTS FROM 1918-1952
 Includes Snow Removal

Mileage		Mileage	
1918	\$16,596.54	1936	2,656.68
1919	29,330.21	1937	2,697.82
1920	44,323.34	1938	2,770.20
1921	33,601.26	1939	2,805.90
1922	61,997.55	1940	2,908.48
1923	442.98	1941	2,941.22
1924	765.23	1942	3,015.76
1925	903.90	1943	3,047.80
1926	1,213.43	1944	3,084.67
1927	1,445.08	1945	3,081.740
1928	1,680.73	1946	3,093.242
1929	1,875.16	1947	3,273.091
1930	1,905.43	1948	3,421.747
1931*	2,061.34	1949	3,507.980
1932	2,113.02	1950	3,565.956
1933	2,151.64	1951	3,750.088
1934	2,287.37	1952	3,770.602
1935	2,524.77		

*Seven months' expenditures, December 1, 1930, to June 30, 1931.

TABLE NO. 10
SNOW REMOVAL COSTS 1923-1952*

1923	\$12,695.38	1938	\$59,468.88
1924	884.53	1939	71,681.61
1925	1,479.13	1940	42,403.61
1926	1,803.43	1941	57,008.71
1927	8,228.95	1942	87,357.42
1928	3,167.50	1943	60,386.97
1929	16,172.05	1944	94,585.25
1930	19,466.28	1945	103,521.25
1931	4,711.45	1946	104,222.71
1932	83,632.96	1947	102,053.10
1933	83,497.61	1948	130,913.49
1934	8,227.13	1949	368,127.41
1935	28,573.76	1950	170,748.71
1936	50,948.37	1951	122,757.57
1937	131,066.03	1952	603,200.27

*Snow removal costs prior to 1923 not available.

TABLE NO. 11
CONSTRUCTION AND RECONSTRUCTION COMPLETED AND UNDER
CONTRACT ON THE DESIGNATED STATE HIGHWAY SYSTEM AT
THE CLOSE OF THE BIENNIUM.

Type	Miles new construction completed during biennium	Miles recon- struction completed during biennium	Miles new construction under contract at close of biennium	Miles recon- struction under contract at close of biennium	Totals
Gravel.....	108.7	0.4	76.4	-----	185.5
Roadmix.....	232.0	58.7	158.1	77.1	525.9
Plantmix.....	13.0	49.3	-----	69.1	131.4
Totals.....	353.7	108.4	234.5	146.2	*842.8

*Includes 10.8 miles constructed with Forest Highway Funds by Bureau of Public Roads.

TABLE NO. 12
BRIDGE AND GRADE SEPARATION SUMMARY

Type	STRUCTURES BUILT BY STATE HIGHWAY DEPARTMENT				Structures on highway system <i>not</i> built by State Highway Department	Total structures as of June 30, 1952
	Constructed or under construction as of June 30, 1950	Constructed during biennium or under construction June 30, 1952	Structures abandoned during biennium	Total as of June 30, 1952		
Plain concrete.....	4	0	0	4	1	5
Reinforced concrete.....	107	12	0	119	1	120
Structural steel.....	29	0	1	28	11	39
Timber.....	56	2	1	57	8	65
Composite structures (Reinforced concrete and structural steel).....	11	0	0	11	0	11
Totals	<u>207</u>	<u>*14</u>	<u>2</u>	<u>219</u>	<u>21</u>	<u>240</u>
Total length of structures in feet.....	17,888	1,214	172	19,701	1,711	21,412

* Seven bridges widened or lengthened not included.

TABLE NO. 13
DESCRIPTION OF FEDERAL-AID ROADS, JUNE 30, 1952

F. A. Road No.	Termini	Mileage*
1	U. S. 40 from the California-Nevada State line near Verdi via Reno, Sparks, Fernley, Lovelock, Winnemucca, Battle Mountain, Elko and Wells to the Nevada-Utah State line at Wendover, except that portion in the Reno-Sparks urban area	411.3
2	U. S. 50 from the California-Nevada State line southwest of Spooners via Carson City, Dayton, Fallon, Austin, Eureka and Ely to a junction with U. S. 40 near Wendover	468.2
3	U. S. 395 from the California-Nevada State line south of Holbrook via Minden to a junction with U. S. 50, three miles south of Carson City; beginning again in Carson City and continuing through Reno to the Nevada-California State line northwest of Reno, except that portion within the Reno urban area	76.8
4	U. S. 6 from the California-Nevada State line southwest of Basalt via Basalt, Coaldale and Tonopah to a junction with U. S. 50 in Ely; beginning again in East Ely and via Connors Pass and Sacramento Pass to the Nevada-Utah State line en route to Delta, Utah	306.2
5	U. S. 91 from the California-Nevada State line south of Jean, via Jean, Las Vegas, North Las Vegas (along both Fifth and Main Streets), Glendale and Mesquite to the Nevada-Arizona State line, except that portion within the Las Vegas urban area	121.2
6	U. S. 95 from the California-Nevada State line south of Searchlight via Searchlight, Railroad Pass, Las Vegas, Beatty, Goldfield, Tonopah, Mina, and Hawthorne to a junction with U. S. 50 in Fallon; beginning again at the junction of U. S. 50 at Leeteville via Hazen to a junction with U. S. 40 east of Fernley; beginning again at the junction of U. S. 40 in Winnemucca via Orovada to the Nevada-Oregon State line at McDermitt; also a spur from Railroad Pass via Boulder City to the Nevada-Arizona State line at Hoover Dam (Boulder Dam), except that portion within the Las Vegas urban area	516.4
7	U. S. 93 from Caliente via Pioche to a junction with U. S. 6 at the east foot of Connors Pass; beginning again at the junction of U. S. 50, five miles south of the Elko-White Pine County line via Currie, Wells, and Contact to the Nevada-Idaho State line north of Contact	252.0
8	State Route 25 from a junction with U. S. 93, one mile west of Panaca via Panaca to the Nevada-Utah State line en route to Modena, Utah	20.9
Total		2,173.0

*Surveyed mileage used on roads having unimproved sections as of June 30, 1952. There were 9.1 miles unimproved on F. A. Route 5.

TABLE NO. 13A
DESCRIPTION OF FEDERAL-AID URBAN ROUTES, DECEMBER 31, 1951
Reno-Sparks Urban Area Routes

F. A. U. Route No.	Termini	Mileage*
040310	Kietzke Lane extension from East Second Street in Reno to a junction with U. S. 40 in Sparks	1.1
040311	U. S. 40 from the west Reno urban limits to the east Sparks urban limits	5.4
040313	U. S. 395 from the south Reno urban limits to north Reno urban limits	3.0
Las Vegas Urban Area Routes		
030265	Fifth Street in Las Vegas from the south urban limits of Las Vegas to the north urban limits of Las Vegas	3.4
030275	Main Street in Las Vegas from its south junction with Fifth Street to the north urban limits of Las Vegas	3.0
030266	Along Charleston Boulevard and Rancho Road from the Charleston Boulevard junction with U. S. 93 near the east urban limits of Las Vegas to the junction of Rancho Road with U. S. 95	4.4
030276	Along U. S. 93 (Fremont Street) from the east urban limits of Las Vegas to the junction of Fremont and Main Streets	1.9
030286	Along Bonanza Road and U. S. 95 from the junction of Fifth Street and Bonanza Road to the north urban limits of Las Vegas	3.1
Total		25.3

*Surveyed mileage used on road having unimproved section.

TABLE NO. 14
TABLE SHOWING STATUS OF MILEAGE ON THE VARIOUS "STATE-INTEREST" HIGHWAY SYSTEMS IN
NEVADA AS OF DECEMBER 31, 1951

County	IMPROVED BY STATE HIGHWAY DEPARTMENT			State interest roads* not improved by State	Grand total, all types and all systems
	Federal-aid system	Federal-aid secondary	Remaining State Highway system		
Churchill	152.1	51.0	203.1	57.4	260.5
Clark	265.6	140.0	406.8	213.9	622.7
Douglas	49.5	39.1	90.0	16.7	106.7
Elko	331.4	133.8	465.2	330.6	845.8
Esmeralda	115.8	59.7	175.5	27.7	232.5
Eureka	74.1	89.2	163.4	138.6	302.0
Humboldt	135.3	86.2	221.6	195.2	416.8
Lander	103.9	105.8	209.7	108.6	338.9
Lincoln	99.8	152.0	251.8	145.4	397.2
Lyon	62.5	136.9	199.4	91.2	290.6
Mineral	107.5	61.2	168.7	67.8	236.5
Nye	240.7	151.8	392.5	291.6	708.2
Ormsby	20.7	11.4	32.1	3.3	39.2
Pershing	75.0	26.2	101.2	191.8	293.0
Storey	89.2	12.7	101.9	22.8	35.5
Washoe	131.4	13.4	234.0	324.9	558.9
White Pine	265.0	88.7	353.7	154.0	507.7
Totals	2,188.1	1,497.1	3,799.2	2,383.5	6,182.7

MILEAGE BY SURFACE TYPES AND SYSTEMS, AS OF DECEMBER 31, 1951

(A-B)	Primitive and unimproved				
(C-D)	Graded and drained and soil surfaced				
(E)	Gravel on crushed stone				
(F)	Bituminous surface treated				
(G)	Roadmix of plantmix surface				
(H-I)	High-type bituminous				
(J)	Portland cement concrete				
(M)	Combination surface types				
Totals	2,188.1	1,497.1	114.0	3,799.2	

*State-interest roads are all routes on the State-designated system or the Federal-aid Secondary System.

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